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REVIEWS AND BOOK NOTICES.

INTRODUCTION TO GENERAL BIOLOGY.*—Though the plan of this little manual is good, being identical with the arrangement of the examination questions in the Science and Art Department of Instruction at South Kensington, we cannot speak favorably of its execution, or advise the use of the book in this country, unless carefully revised. A want of special knowledge of the subject, and the usually execrable woodcuts, wherever not copied from other works, detract seriously from the value of the book.

PUBLICATIONS OF WHEELER'S SURVEY.†—Besides the maps issued by this survey we now have a Catalogue of Plants collected in the years 1871, 1872 and 1873, with descriptions of a few new species, by Mr. Sereno Watson and Dr. J. T. Rothrock, botanist, aided by Messrs. Hoopes, Olney, Vasey, Eaton, James and Austin.

The report upon the birds collected in Utah and Nevada during the same years, by Dr. Yarrow, abounds in notes on habits and geographical distribution.

THE GEOLOGICAL SURVEY OF INDIANA.‡—While this last year's report of the Survey is mainly on economic geology, as it should be, it contains some archæological and palæontological notes of interest.

BOTANY.

YUCCA FILAMENTOSA.—Dr. Engelmann's interesting observations on the genus *Yucca*, and Prof. C. V. Riley's discoveries in relation to the yucca moth,§ have turned attention generally to this family of plants. The *Yucca filamentosa* is the species most commonly cultivated in the central United States. It is found

*An Introduction to the Study of General Biology, designed for the use of School and Science Classes. By Thomas C. MacGinley. With 124 illustrations. Putnam's Elementary Science Series. New York, G. P. Putnam's Sons. 12mo. pp. 199. Price 75 cts.

†Report upon Ornithological Specimens collected in the years 1871, 1872 and 1873. By Dr. H. C. Yarrow. Washington, D. C. 8vo. 1874. pp. 148. Catalogue of Plants collected in the years 1871, 1872 and 1873, with descriptions of New Species. Wheeler's Geographical and Geological Explorations and Surveys West of the 100th Meridian. Washington, D. C. 1874. 8vo. pp. 62.

‡Fifth Annual Report of the Geological Survey of Indiana, made during the year 1873. By G. T. Cox, State Geologist, assisted by Prof. John Collett, Prof. W. W. Borden and Dr. G. M. Levette. Indianapolis, 1874. 8vo. pp. 494. With plates and maps.

§Trans. St. Louis Acad. Science, 1873, and AMERICAN NATURALIST, vol. 7.

growing wild in Virginia and southward. The generic name *Yucca* is supposed to be of Indian origin; its signification is not known. The specific name *filamentosa* is expressive of the thread-like filaments found on the edges of the leaves. The popular names of this plant are Spanish bayonet, Adam's needle and bear grass. The name first mentioned was probably suggested by the form of the leaves. In the backwoods of West Tennessee this yucca is called "bar grass," "bar" probably being the rural for bear; the tough leaves are used there for suspending meat in the smoke-house. The peculiar perfume of the flowers of this plant is not perceptible in the daytime. I have known floriculturists who have had the plants in their gardens for years without discovering that they possessed fragrance. In this latitude, Jacksonville, Ill., the perfume begins to exhale about 7 o'clock, P. M. It is sufficiently like that given off from a wasp when disturbed, to make nervous persons uneasy if unacquainted with its origin. It is worthy of note that the *Yucca* moth makes its appearance on the plant soon after its perfume becomes perceptible. This summer, having a blooming plant of the *Y. filamentosa* in my garden, I determined to see what I could of its wonders for myself; my tools were a simple hand microscope and a number of little tarlatan bags with draw strings. With the latter, four experiments were tried. The first one was to test the ability of the flower to pollinize itself. Four large buds on different branches and almost ready to open, were selected, a bag was drawn over each of these and fastened by the draw string to the stem beyond the flower. With the view of throwing as much strength as possible into the flowers operated on, all the other flowers on these branches were removed. The buds expanded in their gauzy covering as perfectly as their unveiled sisters, but like nuns of another order they drooped and died, leaving no progeny behind them. The second experiment was to pollinize the flower, by itself, artificially. The buds were gently opened and some pollen scraped from their anthers with a small penknife and placed in the entrance to the stigmatic tube. The buds were then enveloped in bags and the branches stripped off the other flowers and buds as in the former case. These also failed to develop seeds. The third experiment was to pollinize artificially from another plant. The operation was conducted like the above, and like the above failed to produce seeds. The fourth experiment was to pollinize

artificially from other flowers on the same plant. One large perfect capsule of seed resulted from this attempt. In this capsule the indentations around the middle, which forms so constant a feature in this species was not present. Was this variation from the usual form the result of unusually perfect fertilization, or from the protection from the puncture of insect afforded the seed-pod by the gauze? This peculiarity of the seed-pods of the *filamentosa* calls for further investigation. If it be a development of the natural growth of the plant and not caused by external agencies, it is interesting to note how it may be made to vary as in the above case. If it be caused by deficient fertilization or from the puncture of insects, why are the indentations so uniformly in the middle of the capsule?

In the three experiments where pollen was used, the pollen was placed as nearly as possible in the same position in each flower, viz., just at the entrance to the stigmatic tube; the result confirms the view taken by Dr. Engelmann in relation to the difficulty of this flower being pollenized by other natural agencies than that afforded by the yucca moth. She thrusts her mass of pollen far into the stigmatic opening, thus insuring fertilization. If, as is probable, the yucca plant preceded the yucca moth in existence, the plant is so prolific in bloom and in seeds, that if but a very small proportion of the flowers were fertilized by the usual agencies, there would still be enough seeds produced to perpetuate the species abundantly; for each capsule contains from one to three hundred seeds. After the seeds on my plant had turned black and before the yucca grubs had eaten out, forty-one capsules were carefully examined, of these twenty-four contained grubs, one held six of the little fellows. In no case was there more than one grub found in the same end of a row of seeds, occasionally one was found at each end of a row and the grubs were found quite as often at one end as at the other of the capsules. My plant was frequently disturbed. It would appear from the unusually large proportion of capsules without grubs, that the moth may be more successful in fertilizing the flowers when disturbed, than in finding a safe harbor for her eggs. If the discoveries made in regard to the fertilization of this plant can be sustained on further investigation, more than ordinary intelligence must be ascribed to the yucca moth, 1st, for her foresight in making ready the way for her progeny to be supported, and this, by *indirect* means; 2nd, in

her wise disposition of her eggs so that the larvæ cannot interfere with each other's supply of food. May not this little insect while fluttering around within the flower, seeking a place to deposit her eggs, accidentally become laden with pollen? Then, when her work is done and she ascends the stigma to regale herself with its sweets, she brings her pollen-laden antennæ in contact with the stigmatic surface, thus unwittingly performing her part in this life drama.—J. M. MILLIGAN.

THE DISTINCTIVE FEATURES OF APPLE FLOWERS.—We make a brief abstract of an essay on this subject by Prof. W. J. Beal, of the Michigan Agricultural College. The essay is contained in vol. iii of the Report of the State Pomological Society. Each flower bud of the apple contains five to eight flowers. The centre flower opens first, and is often provided with poor anthers; it is most likely to set for fruit so far as the author has observed. The immense number and often very great similarity of varieties of apples make it often difficult to recognize and define them by the fruit alone, as is mostly done. No pomologists that he could hear of have made any use of the flowers of apples as a means of classifying them. He says, "the petal of the red astrachan is one and a fourth inches long by three-fourths broad. It is ovate. The petal of a Tolman Sweet is twelve-sixteenths by seven-sixteenths of an inch, and is elliptical. Its length is about the breadth of the red astrachan. The petal of the Porter is thirteen-sixteenths by twelve-sixteenths and is nearly orbicular. It is also cordate at the base, different from the other two varieties. Large numbers of flowers were examined on several trees of each, except the Porter. The petal of the sweet bough is seventeen-sixteenths by fourteen-sixteenths of an inch. It is broadly ovate, with a stem or claw longer than either of the other three varieties mentioned. Other varieties were examined with similar results. The styles also vary much in size and in other respects in different varieties. They are usually united about half-way, and mostly smooth for the greater part of their length. In the Tolman Sweet, the styles are united in one small column for half their length, then appear larger. The upper half of the styles are closely covered and bound together by a dense woolly substance, unlike the styles of any other variety examined. The sepals also differ considerably in different varieties." The author is confident that much use

can be made of the flowers in defining varieties of apples. This may seem a simple matter to botanists, but it must be new to most pomologists, for some of the best of them say there is little difference in the flowers of apples.

ZOOLOGY.

NOTE ON THE SYNONYMY OF *TELEA POLYPHEMUS*.*—In a paper read before the Royal Dublin Society, March 18, 1872, Mr. W. F. Kirby prefers the name *paphia* L., for our common species of *Telea*, and says: "It has, I think, been questioned whether Cramer's *Attacus polyphemus*, from Jamaica, is identical with this common species." It is Dr. Packard who writes of Cramer's figures under the names "*Cecropia*," "*Polyphemus*" and "*Promethea*," as received from the West Indies, that they "would lead one to suppose that they represented distinct species," from those we know from the United States under these names (Proc. Ent. Soc. Phil., 1864, p. 381).

Having received *Telea Polyphemus* from Matamoras, collected by my brother, Capt. F. Harris Grote, and it having been recorded from California by Mr. H. Edwards, we can assign a wide range to this species. Farther to the southward it may be replaced by the Mexican *Telea Montezuma* Grote, Trans. Am. Ent. Soc., 2, p. 118. My studies of this Bombycid lead me to believe that the typical *Attaci* are entirely unrepresented in the West India Islands. The positive demonstration of this as a fact would be highly interesting as throwing some light on the geological history of the Islands. I am, then, inclined to regard Cramer's habitat for our *Attaci* as erroneous, and to account for the discrepancies of his figures, by an infidelity of execution.

I do not find any description of a species of *Attacus* under the name *Polyphemus* by Linné. The first description seems to be that of Cramer, and the species is afterwards described under the same name by Fabricius (*Species Insectorum*). This corrects the synonymy proposed by Dr. Packard, who cites Linné as authority for the species, referring to the "*Syst. Nat.* (1767)."

Linné describes his *B. paphia* first in "*Syst. N. X.*" 1758, as from "*Guinea*," p. 496, No. 4, and cites "*Petiv. Gazoph.*" tab.

* I am indebted to Dr. Hermann A. Hagen of Cambridge, Mass., for bibliognostic information used in the present article.